Taxonomy of the Kelp Gull *Larus dominicanus* Lichtenstein inferred from biometrics and wing plumage pattern, including two previously undescribed subspecies

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The Kelp Gull's *Larus dominicanus* Lichtenstein extensive range discontinuously encircles the globe in a broad subantarctic belt, where breeding occurs mainly on isolated islands. By contrast, Kelp Gulls also breed on continental South America where their latitudinal range extends over *c.* 60°, reaching a northern limit at the equator (Higgins & Davies 1996, Haase 1996). The species breeds in South America (including the Falklands and South Georgia, and north to Ecuador on the west coast and in Brazil to 26°S on the east coast), Antarctica (and South Shetlands, South Orkneys, South Sandwich Islands), New Zealand, New Zealand islands, Macquarie Island, Australia, southern Africa, southern Madagascar and subantarctic Indian Ocean (Kerguelen, Crozet, Heard, Marion and Prince Edward Islands). There have been no detailed studies of geographical variation in the species, and populations have not proved to separate clearly into subspecies on the basis of measurements (Dwight 1925), but Higgins & Davies (1996) suggested that latitudinal and longitudinal analyses of measurements might reveal clines. Kinsky (1963) considered, from measurements of New Zealand birds, that all measurements increase up to three years old; though often quoted in later literature, this was never tested statistically.

The Kelp Gull has customarily been divided into two subspecies (Brooke & Cooper 1979): *L. d. vetula* breeding in South Africa and Namibia and recognised by its large size and dark iris in breeding adults (Brooke & Cooper 1979), and the nominate subspecies breeding in all other locations. Birds from Madagascar are of unknown status (Brooke & Cooper 1979, Morris & Hawkins 1998, Sinclair & Langrand 1998). Previous studies of geographical variation in this species have considered biometrics and iris colouration, but not plumage characters. However, Jiguet *et al.* (2001) recently illustrated the existence of marked geographical variation in primary pattern and bare parts colouration. Nominate birds show the classic wing pattern of the species: one white mirror - on the longest outermost primary - and an average of two white tongues on median primaries, isolating the black tip of the feather on the inner web.

In this study, I first investigate the relationship between biometrics and age in one population, in order to test Kinsky's (1963) hypothesis. I also investigate latitudinal clinal variation of biometrics for populations inhabiting South America. I finally segregate birds of different geographical origin using biometrics alone, or biometrics and wing pattern, and identify groups that could correspond to distinct subspecies.

Material and methods

Study material

Birds used in the analyses were the 243 specimens held at the Muséum national d'Histoire naturelle, Paris, France (MNHN) and the Natural History Museum, Tring, UK (BMNH). Each bird was referenced according to the locality of collection. Not all specimens were sexed, so sample sizes used in the analyses vary according whether sex is taken into account. One specimen preserved at the BMNH, said to have been collected in South Africa, was part of the Meinertzhagen collection (registration n° 1965/m/3982). Due to concerns over the mis-labelling of Meinertzhagen specimens (Knox 1993), this was excluded from further analyses on biometrics, but was included in principal components and discriminant analyses to verify its geographical origin.

Biometrics and wing pattern

Maximum wing chord, tarsus length, culmen length, bill depth at gonys and bill depth at the base of the nostrils were measured (nearest mm) by the author on all specimens. Birds in active moult of the longest primaries were excluded from analyses involving wing length. Two wing plumage characters of adult birds were recorded (Fig. 1): (1) the number of white mirrors on the two longest primaries (primaries numbered decendantly; recorded as 1 if present on P10 only; 1.5 if present on P10 and very restricted on P9; 2 if obviously present on both P9 and P10); (2) the number of white tongues between black tip and sooty black base on median primaries from P4 outwards (range 1-3).

Age-related variations in biometrics

To test whether size increases with age (Kinsky 1963), only males from subantarctic Indian Ocean islands provided an adequate sample of known-age birds. Twenty-four birds available were 7 first-, 3 second-, 5 third-years and 9 adults. Their biometrics were compared using Kruskal-Wallis tests.

Latitudinal variations in biometrics

Clinal variations of biometrics (tarsus and wing lengths) were sought in Kelp Gulls from South America, involving birds collected from 6°S (Lobos de Tierra, off Peru) to 56°S (Cape Horn, Patagonia), and including the Falklands and South Georgia. Only adult birds were considered to limit the inclusion of vagrant birds, as non-breeding immature birds are more inclined to disperse than adults (Higgins & Davies 1996). Pearson's correlation coefficients between biometric variables and latitude of collection were calculated for each sex.

Geographical variations

Univariate and descriptive statistics (Analysis of Variance) of biometrics and multivariate statistics (Principal Components Analysis, Multiple Analysis of Variance and Discriminant Analysis) of biometrics alone or both biometrics and wing plumage variables were used to look for geographical variations.

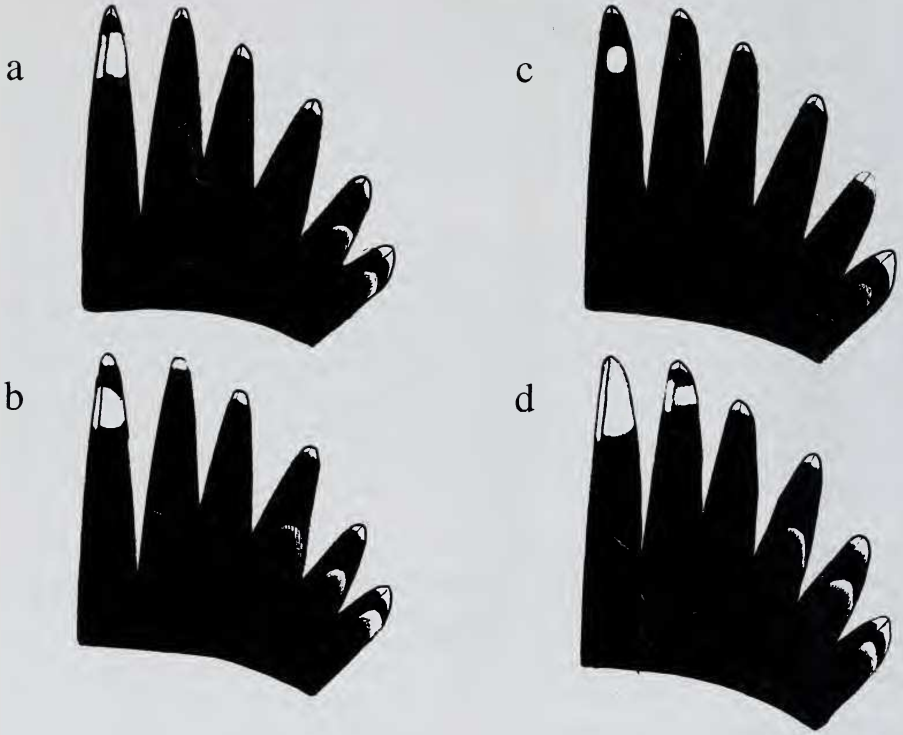

Figure 1. Outer primary pattern (from P5 to P10, primaries numbered descendantly) of adult Kelp Gulls *Larus dominicanus* from different geographical origins, to show how the mirror and tongue scores were recorded. a) a nominate *dominicanus* from eastern South America (mirror score MS 1, tongue score TS 2); b) an Antarctic bird (MS 1, TS 3); c) a Malagasy bird (MS 1, TS 1); d) a bird from Kerguelen (MS 2, TS 3)

I performed two different Principal Component Analyses (PCA). In a first PCA, I considered only the five biometric variables, for birds at least 3 years old (as some measurements increase until this age, see Kinsky (1963) and below). In a second PCA, I included both biometrics and wing plumage variables for adults only.

I further used parametric Discriminant Analysis and an error rate estimate in classification - the jack-knife cross-validation technique (Wilkinson 1990) - to test how birds from geographically distinct origins discriminate. This technique provides an upper limit of error count estimates. The jack-knife classification matrix uses functions computed from all data except the case being classified. I performed two different discriminant analyses involving only adult birds. The first involved only biometrics, the second biometrics and plumage variables. The locations of collection were grouped into ten different global areas that are well separated geographically: southern Africa, eastern South America (from 23° to 34°S: north Argentina, Brazil and Paraguay, where the nominate form *L. d. dominicanus* is supposed to occur), western South America (from 6° to 41°S: Peru, north and central Chile), Patagonia (from 51° to 56°S: southern Argentina and southern Chile, i.e. southern South America), Falkland Islands (52°S), South Georgia (55°S), Antarctica (64-65°S), New Zealand, Madagascar and subantarctic Indian Ocean islands (Kerguelen, Crozet and Heard Islands). Adult birds of both sexes and of unknown sex were used together in the discriminant analyses. Therefore, populations that would highly discriminate should be controlled for sex-ratio, to verify that they are not totally biased towards one sex, and that the statistical model is not merely discriminating males and females. Unfortunately, sample sizes were too small to separate sexes in the multivariate analyses.

All statistical analyses were performed using SYSTAT (Wilkinson 1990). Statistical tests were considered significant at $P < 0.05$.

Results

Age-related and latitudinal variations in Kelp Gull biometrics

The biometrics of males of different ages from the subantarctic Indian Ocean islands revealed that neither wing chord ($df = 3$; $H = 3.45$, $P = 0.327$), nor tarsus ($H = 0.94$, $P = 0.816$) nor culmen length ($H = 4.94$, $P = 0.176$) varied with age. Only bill depth increased with age ($H = 12.68$, $P = 0.005$ for depth at gonys, and $H = 10.83$, $P = 0.013$ for depth at nostrils), but no significant differences remained between 3-year old and adult birds ($df = 1$; $H = 3.24$, $P > 0.1$ for gonys, and $H = 0.04$, $P > 0.8$ for nostrils). For these reasons, further univariate analyses involving wing chord, tarsus and culmen lengths include data on birds of all ages mixed (from fully grown juveniles to adults), while those involving bill depths include only data on birds at least three years old. All multivariate analyses use only data on adult birds.

Pearson's correlation coefficients between biometric variables and latitude of collection for each sex of Kelp Gull in South America showed that culmen length varied significantly with latitude in both males and females, with the longest culmen in the north, the shortest in the south (Table 1). Wing chord was not significantly related to latitude, while tarsus was weakly so for females.

Biometrics, wing plumage pattern and geographical location of origin

I found differences in biometrics when comparing birds from different populations using univariate statistics, with most differences concerning wing and culmen lengths

TABLE 1

Pearson's correlation coefficient between latitude and biometric variables in adult male (n = 33) and female (n = 22) Kelp Gulls of South America, from Peru to Patagonia (including the Falklands and South Georgia). P values are two-tailed, and values in bold are still significant after Bonferroni correction.

	Male		Female	
Variable	r	P	r	P
Wing	-0.085	n.s.	-0.119	n.s.
Tarsus	-0.145	n.s.	-0.540	< 0.01
Exposed culmen	-0.619	**< 0.001**	-0.637	**< 0.002**
Gonys depth	0.098	n.s.	-0.022	n.s.
Nostrils depth	0.088	n.s.	0.102	n.s.

(Table 2; see also Table 6). A Principal Components Analysis, performed to visualise the geographical variations in the five biometric variables for adults (Table 3), did not suggest a clear separation between birds from different origins, or between already recognised subspecies, with large overlaps between all of them (Fig. 2a). However Antarctic birds appeared to separate well on a graph with principal components 1 and 3 as axes (Fig. 2b). I further performed a Discriminant Analysis, considering the ten groups of geographically different origins as different *a priori* groups (Table 4; n =

TABLE 2

Univariate tests comparing biometrics of Kelp Gulls from different populations. See Table 7 for details on biometrics of all populations considered and their name abbreviations.

Sex		Statistic[1]	P	differing populations [2]
Male	Wing length	$F_{9,99} = 11.3$	< 0.001	Ju/Do, Ju/Pa, Ju/Au, Me/Au, Au/Nz, Au/Fa, Au/SA
	Tarsus length	$F_{9,102} = 3.55$	0.001	Ju/Ve
	Exposed culmen	$F_{9,102} = 15.5$	< 0.001	Ju/Ve, Ju/SA, Ju/Me, Me/SG, Do/Fa, Do/SG, Do/Au, Au/Ve, Au/SA, Fa/SG, Fa/SA, Fa/Ve, SG/Ve, SG/Nz, SG/Pa, SG/SA
	Gonys depth	$F_{9,59} = 2.57$	0.014 [3]	-
	Nostril depth	$F_{9,59} = 3.21$	0.030[3]	-
Female	Wing length	$F_{9,83} = 6.89$	< 0.001	Ju/Pa, Ju/Au, Au/Do, Au/Ve, Au/SA, Au/Fa
	Tarsus length	$F_{9,84} = 2.31$	0.023 [3]	-
	Exposed culmen	$F_{9,83} = 10.8$	< 0.001	Ju/Ve, Ju/SA, Ju/Me, Me/Fa, Me/SG, Ve/Fa, Ve/SG, SA/Fa, SA/SG
	Gonys depth	$F_{9,53} = 2.35$	0.026 [3]	-
	Nostril depth	$F_{9,53} = 0.85$	> 0.5	-

1. Comparisons using One-way ANOVA
2. Using Scheffe *a posteriori* test (significance level at 0.05)
3. Not significant after Bonferroni correction

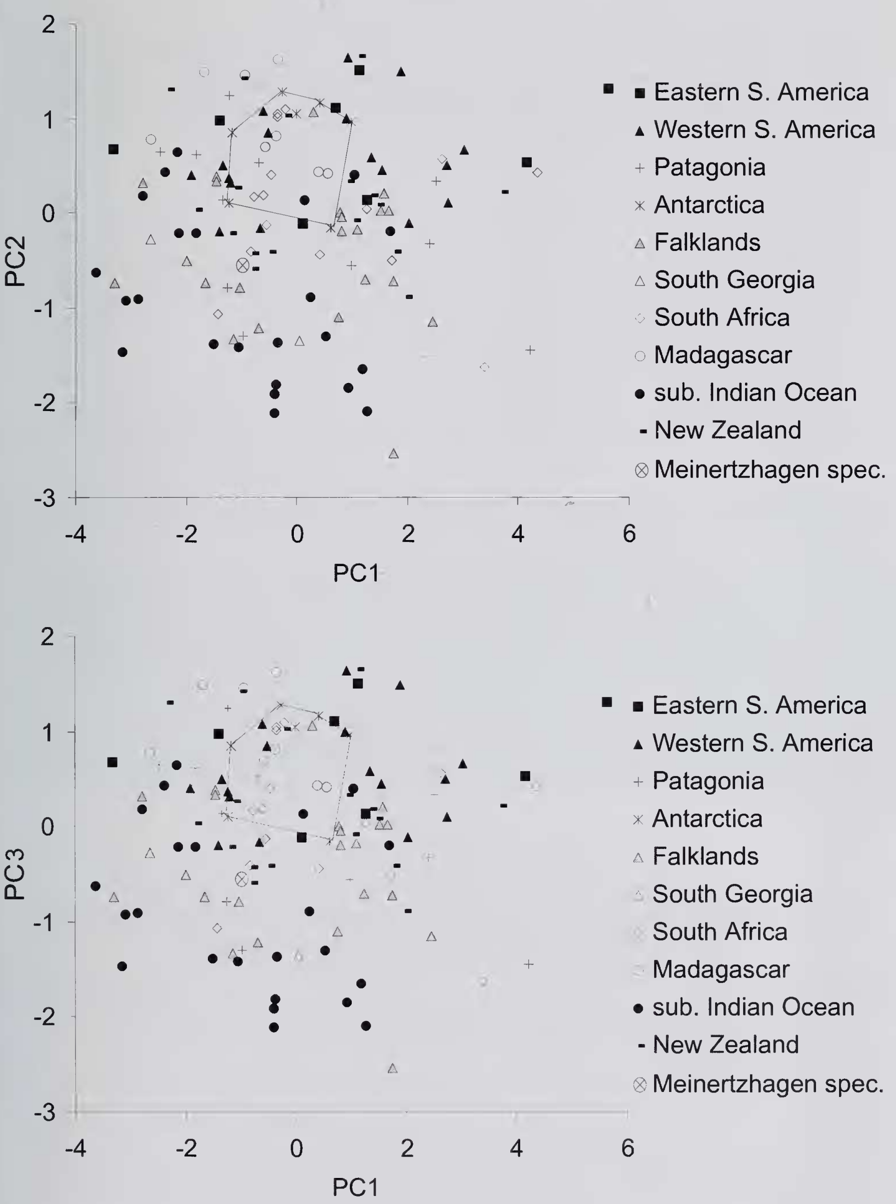

Figure 2. Scatter plots of the first three Principal Components by pairs (a: PC1 and PC2, b: PC1 and PC3), resulting from a PCA performed on 131 adult Kelp Gulls, using five biometric characters. The Antarctic birds are individualized on both figures.

TABLE 3

Results of a Principal Components Analysis performed on 131 adult Kelp Gulls, using five biometric characters. PC1 is positively correlated to all biometric variables, while PC2 is negatively correlated to the bill depths measures and positively to the other three measures.

	PC 1	PC 2	PC 3
Eigen value	3.169	0.859	0.483
% variance explained	63.39	17.18	9.66
Cumulative %	63.39	80.57	90.23
Correlation with axis :			
- Wing	0.748	0.348	-0.532
- Tarsus	0.799	0.315	0.056
- Culmen	0.741	0.411	0.443
- Depth at gonys	0.836	-0.499	0.014
- Depth at nostril	0.850	-0.470	0.016

130 individuals; five biometric variables only). Multivariate Analysis of Variance was highly significant (Wilk's Lambda = 0.120, F = 7.05, df = 45, $P < 0.001$). Using resubstitution and error count estimates, no individual from Antarctica and South Georgia, and only 12% of Malagasy birds, were mis-classified. As resubstitution gives an optimistic estimate of error rate, we also used cross-validation error rate estimate (with a jack-knife classification matrix), which again correctly classified 100% of Antarctic birds, 88% of Malagasy birds, but 0% of South Georgian birds (though expected as sample size is very small, n = 2). No mis-classified bird from Patagonia was attributed to the Antarctic group. In conclusion, segregation is well achieved between Antarctic and to a lesser degree Malagasy birds and all others on the basis of biometrics.

TABLE 4

Results of a discriminant analysis performed on 130 adult Kelp Gulls (the Meinertzhagen specimen is excluded), using five biometric variables only.

Geographical origin	No. of birds	% correct in classification matrix	% correct in jack-knife classification matrix
eastern South America	8	50	25
western South America	17	35	24
Patagonia	11	45	27
Falklands	22	45	45
South Georgia	2	100	0
Antarctica	7	100	100
New Zealand	17	41	41
Madagascar	8	88	88
South Africa	15	33	27
subantarctic Indian Ocean	23	57	52

TABLE 5

Results of a Principal Components Analysis performed on 131 adult Kelp Gulls, using five biometric and two wing plumage characters. PC1 is positively correlated to all five biometric measures, and negatively to the mirror number. PC2 is positively correlated to the wing plumage variables and bill depth measures, and negatively to the culmen length.

	PC 1	PC 2
Eigen value	3.27	1.51
% variance explained	46.7	21.6
Cumulative %	46.7	68.3
Correlation with axis :		
- Wing	0.771	-0.092
- Tarsus	0.803	-0.043
- Culmen	0.782	-0.381
- Depth at gonys	0.785	0.491
- Depth at nostril	0.805	0.444
- Number of white mirror(s)	-0.375	0.660
- Number of white tongue(s)	-0.132	0.694

The second Principal Components Analysis, that examined geographical variations using biometrics plus the two wing plumage variables for adults (Table 5), suggests a separation between birds from the subantarctic Indian Ocean from all other Indian Ocean populations (Fig. 3). Birds from Madagascar also separate from all other populations, with no overlap, even with birds from the closest populations (subantarctic Indian Ocean and southern Africa). I further performed a Discriminant Analysis, considering again the ten groups from geographically different origins as

TABLE 6

Results of a discriminant analysis performed on 131 adult Kelp Gulls (the Meinertzhagen specimen is included with South African birds), using five biometric and two plumage characters.

Geographical origin	No. of birds	% correct in classification matrix	% correct in jack-knife classification matrix
eastern South America	8	63	38
western South America	17	41	29
Patagonia	11	55	27
Falklands	22	68	59
South Georgia	2	100	0
Antarctica	7	100	100
New Zealand	17	29	24
Madagascar	8	100	100
South Africa	16	38	25
subantarctic Indian Ocean	23	100	100

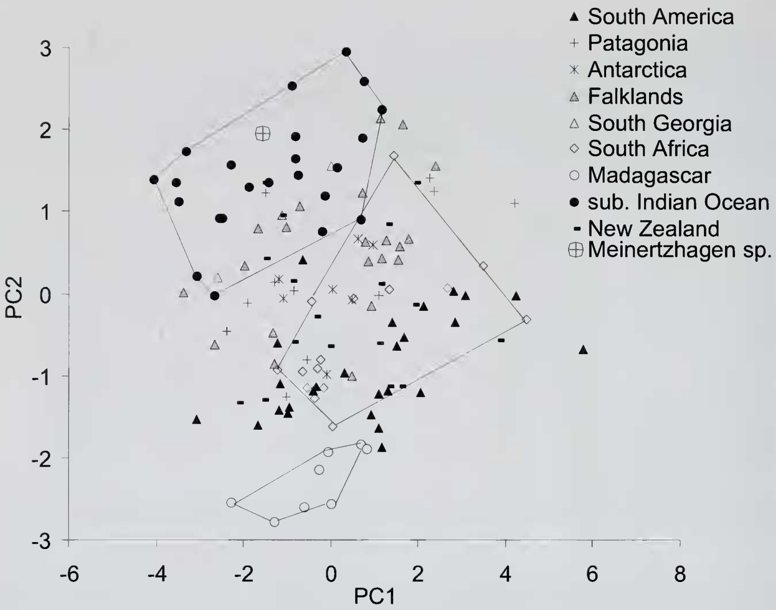

Figure 3. Scatter plot of the first two Principal Components, resulting from a PCA performed on 131 adult Kelp Gulls, using five biometric and two plumage characters. The three populations breeding in the south-western Indian Ocean are individualized (top: subantarctic; middle: southern Africa; bottom: Madagascar).

different *a priori* groups (Table 6). Multivariate Analysis of Variance was highly significant (Wilk's Lambda = 0.027, F = 9.27, df = 63, P < 0.001). Using resubstitution and error count estimates, no individual from Antarctica, South Georgia, subantarctic Indian Ocean and Madagascar was mis-classified. The cross-validation error rate estimate again correctly classified 100% of Antarctic, subantarctic Indian Ocean and Malagasy birds. No mis-classified bird from Patagonia was attributed to the Antarctic group. In conclusion, segregation is well achieved between at least three groups and all other populations, on the basis of biometrics and wing pattern combined. All of these groups include males and females with no highly skewed sex ratio. In this discriminant analysis, the Meinertzhagen specimen was classified with subantarctic Indian Ocean birds; this origin is also supported by its position on Fig. 3 and its observed phenotype (very short bill: 44.2 mm, two white mirrors, three obvious white tongues; see Tables 7 and 8). This bird could be either mis-labelled (Knox 1993), a vagrant from e.g. Marion Island collected on mainland Africa (records of non *vetula* birds are very scarce but have occurred; Brooke *et al.* (1982)), or a bird collected on e.g. Marion Island (a South African possession) and labelled 'South Africa'. It was excluded from calculations in Tables 7 and 8.

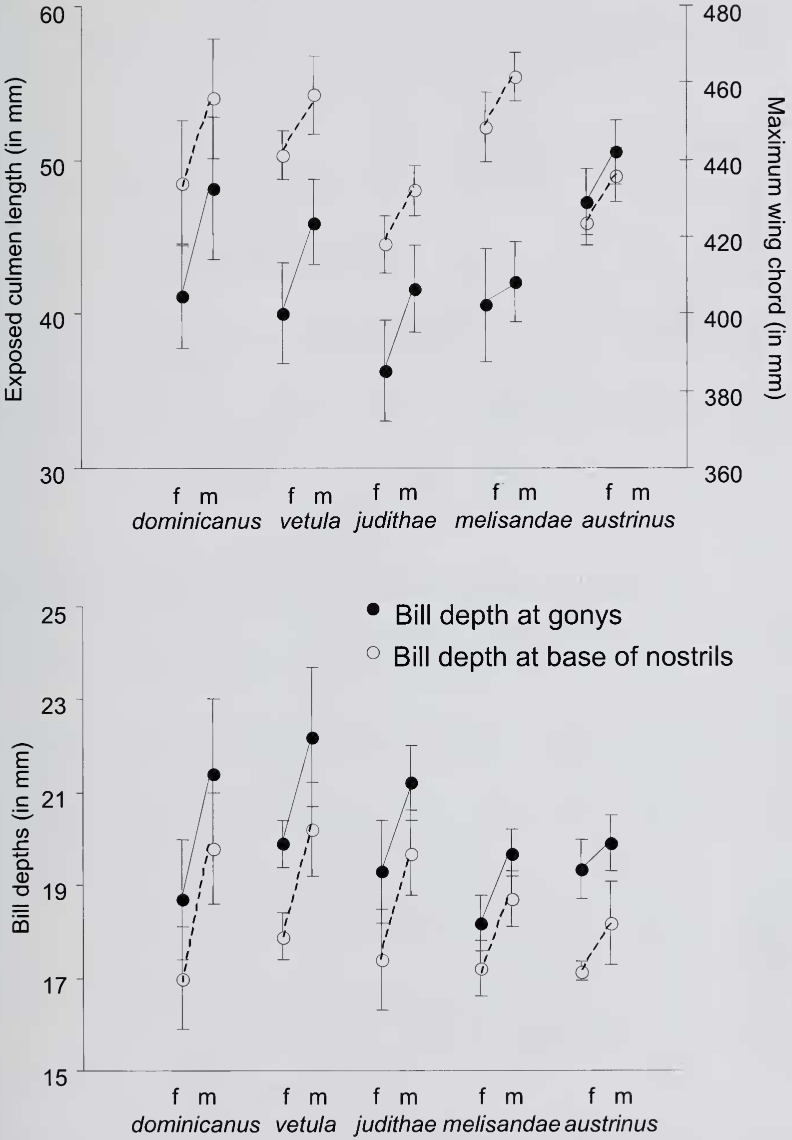

Figure 4. Comparisons of some biometrics (in mm) of females (f) and males (m) of the five different subspecies of Kelp Gull *Larus dominicanus*; a) maximum wing chord (black dots and unbroken lines) and exposed culmen length (white dots and dotted lines); b) bill depths at gonys (black dots and unbroken lines) and at base of nostrils (white dots and dotted lines).

TABLE 7

Measurements (in mm) of *Larus dominicanus* from different subspecies and / or geographical localities and of *L. f. fuscus* and *L. f. intermedius* (for comparison).

				Bill	
Sex*n1 (n2)*	Maximum wing chord	Tarsus length	exposed culmen length	depth at gonys	depth at nostril
Do - Larus dominicanus dominicanus (Brazil, North Argentina, Paraguay)					
M 7 (5)	432.7 ± 18.5 (417-464)	64.4 ± 4.5 (57.9-72.1)	54.0 ± 3.9 (51.2-61.2)	21.4 ± 1.6 (20.5-23.5)	19.8 ± 1.2 (18.8-21.1)
F 5 (3)	404.7 ± 13.7 (395-425)	60.2 ± 4.0 (54.5-65.6)	48.5 ± 4.1 (45.0-54.7)	18.7 ± 1.3 (17.4-20.0)	17.0 ± 1.1 (16.0-18.1)
Ve - Larus dominicanus vetula (South Africa)					
M 12 (7)	423.7 ± 11.1 (408-440)	66.7 ± 4.4 (57.6-72.0)	54.2 ± 2.5 (48.4-57.3)	22.2 ± 1.5 (19.8-24.7)	20.2 ± 1.0 (18.6-21.4)
F 11 (9)	400.1 ± 13.0 (373-417)	61.2 ± 2.3 (56.6-64.1)	50.3 ± 1.6 (47.5-52.7)	19.9 ± 0.5 (19.0-21.0)	17.9 ± 0.5 (17.1-19.0)
Ju - Larus dominicanus judithae ssp. nov. (subantarctic Indian Ocean)					
M 24 (14)	406.5 ± 11.2 (382-428)	61.8 ± 3.2 (55.8-68.9)	48.0 ± 1.6 (44.4-50.5)	21.2 ± 0.8 (19.5-22.4)	19.7 ± 0.9 (18.2-21.3)
F 9 (9)	385.2 ± 13.1 (362-410)	58.3 ± 1.6 (55.7-60.4)	44.5 ± 1.9 (41.8-47.9)	19.3 ± 1.1 (18.0-22.0)	17.4 ± 1.1 (15.7-19.4)
Me - Larus dominicanus melisandae ssp. nov. (Madagascar)					
M 5 (3)	408.3 ± 10.4 (400-420)	59.3 ± 1.2 (58.0-60.0)	55.4 ± 1.6 (53.8-57.0)	19.7 ± 0.5 (19.2-20.2)	18.7 ± 0.6 (18.0-20.2)
F 7 (5)	402.2 ± 14.6 (380-418)	60.5 ± 1.8 (58.3-63.2)	52.1 ± 2.3 (49.6-54.6)	18.2 ± 0.6 (17.4-18.8)	17.2 ± 0.6 (16.8-18.3)
Au - Larus dominicanus austrinus (Antarctica and Antarctic Islands)					
M 13 (5)	442.0 ± 8.3 (421-457)	62.0 ± 2.4 (58.1-65.2)	49.0 ± 1.8 (46.0-51.9)	19.9 ± 0.6 (19.3-20.7)	18.2 ± 0.9 (17.1-19.3)
F 7 (2)	429.1 ± 8.6 (414-442)	59.8 ± 3.6 (55.1-65.2)	45.9 ± 1.5 (43.7-47.4)	18.9 - 19.8	17.0 - 17.3
Nz - Larus dominicanus (New Zealand)					
M 9 (6)	418.1 ± 11.7 (396-432)	62.9 ± 2.7 (58.4-67.2)	50.2 ± 2.4 (45.4-53.2)	20.8 ± 1.5 (18.5-22.6)	18.6 ± 1.0 (17.1-20.2)
F 11 (6)	405.8 ± 14.6 (391-436)	61.0 ± 2.7 (57.0-66.3)	47.4 ± 3.2 (42.1-51.5)	19.9 ± 1.0 (18.6-21.9)	17.2 ± 0.7 (16.6-18.7)
SA - Larus dominicanus (North and Central Chile, Peru, i.e. western South America)					
M 14 (9)	417.2 ± 15.4 (390-444)	64.9 ± 4.3 (56.7-73.8)	53.0 ± 3.3 (46.4-59.0)	20.5 ± 1.3 (18.2-21.9)	18.8 ± 1.4 (17.0-20.8)
F 19 (9)	400.2 ± 11.5 (379-422)	62.3 ± 3.1 (58.0-66.8)	49.9 ± 3.2 (46.0-58.9)	19.9 ± 0.8 (18.9-21.3)	17.9 ± 1.0 (16.8-19.8)
Pa - Larus dominicanus (Patagonia)					
M 8 (4)	438.7 ± 10.5 (425-455)	63.4 ± 2.2 (60.0-67.4)	51.0 ± 1.9 (49.0-54.3)	22.4 ± 1.5 (20.9-24.4)	20.6 ± 1.2 (19.8-22.4)
F 9 (6)	412.2 ± 13.6 (398-440)	58.7 ± 3.1 (54.5-63.6)	47.6 ± 1.4 (46.0-50.8)	19.3 ± 0.8 (17.9-20.2)	17.7 ± 1.1 (16.7-19.4)
Fa - Larus dominicanus (Falkland Islands)					
M 20 (14)	418.6 ± 10.4 (401-432)	63.7 ± 2.4 (59.5-68.0)	49.3 ± 2.3 (45.0-53.4)	21.3 ± 1.1 (19.8-23.9)	19.7 ± 1.0 (17.9-21.2)
F 11 (8)	401.2 ± 9.2 (385-416)	60.3 ± 3.3 (55.1-64.5)	44.7 ± 2.5 (40.8-49.4)	19.2 ± 0.8 (18.1-20.3)	17.6 ± 0.9 (16.4-19.1)
SG - Larus dominicanus (South Georgia)					
M 4 (2)	418.7 ± 5.1 (413-423)	61.0 ± 1.9 (58.1-62.2)	43.7 ± 2.0 (41.0-45.4)	19.7 - 21.6	17.6 - 19.1
F 4 (2)	401.7 ± 8.4 (394-410)	59.0 ± 4.2 (54.6-64.6)	42.0 ± 1.6 (40.1-43.5)	18.6 - 19.0	16.7 - 17.0
L. fuscus fuscus (collected in Middle East and East Africa)					
M 9	435.6 ± 7.1 (426-446)	59.5 ± 2.6 (55.2-62.3)	50.5 ± 1.6 (48.1-52.7)	16.4 ± 0.9 (15.5-18.5)	15.9 ± 0.8 (15.2-17.2)
F 5	410.6 ± 10.9 (394-422)	59.1 ± 1.7 (56.8-61.0)	46.1 ± 2.1 (44.4-49.7)	15.5 ± 1.2 (14.2-17.4)	14.7 ± 1.0 (13.9-16.1)
L. fuscus intermedius (collected in North Europe and North Africa)					
M 6	416.8 ± 14.6 (403-437)	61.0 ± 1.1 (59.3-62.4)	50.9 ± 2.0 (47.7-53.0)	15.8 ± 0.6 (15.0-16.6)	15.1 ± 0.8 (14.3-16.0)
F 6	396.2 ± 6.3 (389-404)	56.6 ± 1.8 (53.9-58.8)	46.1 ± 2.7 (42.4-50.0)	14.7 ± 0.5 (14.1-15.5)	14.2 ± 0.6 (13.6-15.1)

NOTES. Measurements are mean ± standard deviation (range), M = male, F = female. Area and place names in parentheses indicate where specimen were collected. n1: sample size including adult and all immature birds for which I present wing, tarsus and exposed culmen measurements. n2: sample size of adult and immature birds at least three years old for which I present also bill depth measurements.

TABLE 8

Mirror and tongue scores of *Larus dominicanus* from different localities and of *L. f. fuscus* and *L. f. intermedius* (for comparison). Means ± s.d. (ranges).

Taxon and / or locality	N	Mirror score	Tongue score
Larus dominicanus dominicanus	8	1	1.8 ± 0.3 (1.5-2)
L. dominicanus vetula	15	1.0 ± 0.1 (1-1.5)	1.9 ± 0.5 (1,5-3)
L. dominicanus austrinus	7	1	2.9 ± 0.4 (2-3.5)
L. dominicanus judithae ssp. nov.	23	2	2.4 ± 0.5 (2-3)
L. dominicanus melisandae ssp. nov.	8	1	1.2 ± 0.3 (1-1.5)
L. dominicanus - western South America	18	1	1.9 ± 0.4 (1-3)
L. dominicanus - Patagonia	11	1.1 ± 0.2 (1-1.5)	2.5 ± 0.5 (2-3)
L. dominicanus - Falklands	22	1.1 ± 0.2 (1-1.5)	2.7 ± 0.4 (2-3)
L. dominicanus - South Georgia	3	1	2.7 ± 0.6 (2-3)
L. dominicanus - New Zealand	17	1.2 ± 0.4 (1-2)	2.2 ± 0.6 (1-3)
L. fuscus fuscus	14	1.1 ± 0.3 (1-2)	0.8 ± 0.5 (0-1.5)
L. fuscus intermedius	12	1.0 ± 0.1 (1-1.5)	0.7 ± 0.4 (0-1.5)

Discussion

Age-related and clinal variations in biometrics

Kinsky's (1963) hypothesis that, apart from tarsi and toes, Kelp Gulls continue to grow during their first three years of life was not supported by my statistical analysis of males from subantarctic islands. Here, wing length, tarsus and culmen length attained full size within the first year, and only bill depth continued to increase up to the third year. However, the generality of this conclusion requires confirmation through statistical analysis of adequate samples from females from the subantarctic islands and from both sexes of other populations. Table 7 presents biometric data for males and females of different geographical origins, with wing, tarsus and culmen measurements considering all birds from fully-grown juveniles to adults, while bill depth measurements concern only birds at least three years old.

In terms of geographical variation, Saunders (1896) claimed that within Kerguelen, Kelp Gulls exhibited a range of variation in size that equalled variation throughout the rest of the species' range. Kinsky (1963), however, thought that within New Zealand Kelp Gulls did vary in size geographically, but this conclusion was not supported statistically. Here, I demonstrated clinal variation in the bill and tarsus, but not wing length, over the species' latitudinal range in South America, the only regions for which adequate samples of specimens were available. Within South America and its southern islands, however, statistically significant non-clinal variation in wing length was discovered. Birds from the Falklands and South Georgia, which are resident (Murphy 1936, Prince & Payne 1979), had the shortest wings, while birds of continental origin from Patagonia and the eastern coast had significantly longer wings. This difference might be related to differing migration tendencies if continental birds prove to move longer distances than the island forms.

Distinctiveness of Kelp Gull populations

This study revealed that biometrics of *vetula* are similar to that of nominate *dominicanus* (contra Brooke & Cooper 1979), while both are obviously larger than birds from the southern Indian Ocean (Brooke & Cooper 1979). As dark iris colour in breeding adults occurs in many parts of the species' range (Jiguet *et al.* 2001), *vetula* is probably best identified in the field by its bare parts colours (especially orange – not red – orbital ring turning to pale yellow in winter), though *vetula* is in fact largely discriminated by skull morphology, as pointed out by Chu (1998). Antarctic birds differed clearly from other populations in having short and slim bills and long wings. Birds from subantarctic Indian Ocean islands and from Madagascar are distinct from all other populations of Kelp Gull. The characteristic wing patterns of these two populations are: white mirrors on P9 and P10 for subantarctic Indian Ocean birds, and very restricted white mirror on P10 and white tongues on P5 (P4) of Malagasy birds. The only other population where mirrors commonly occur on the outer two longest primaries is that from New Zealand (*c.* 35% of birds with two mirrors; Higgins & Davies 1996, Jiguet *et al.* 2001). The population from subantarctic Indian Ocean islands is the only one that always shows two obvious white mirrors in full adult plumage whatever the sex or age. Additionally, birds from Kerguelen and Crozet were the smallest of all populations, and birds from Madagascar showed the longest culmen. Birds from South Georgia also showed a surprisingly short culmen (Table 7), and might constitute a distinct taxon, but sample size analysed for this population is very small and further work is needed. Fleming (1924) suggested that birds from the Falklands were probably different from those on the South American continent, but this study failed to find statistically significant differences in the characteristics examined.

Isolation of Kelp Gull populations

The limited evidence from studies of ringed birds supports the idea that most populations of Kelp Gulls, separable on morphological characteristics, are indeed isolated from each other. Antarctic birds are migratory and most leave their breeding sites during winter (Murphy 1936, Parmelee 1992), some reaching Patagonia (ringing recoveries cited in Higgins & Davies 1996). There is no evidence of movement away from breeding islands in the subantarctic Indian Ocean (Weimerskirch *et al.* 1985) or at South Georgia (Prince & Payne 1979). In New Zealand and Tasmania, the maximum distance covered by birds banded as nestlings was 450 km (Higgins & Davies 1996). In South Africa, the maximum dispersal distance of juveniles is 880 km within Africa (Steele & Hockey 1990). Except on the South American mainland, where nothing is known about dispersal, the different Kelp Gull populations are well isolated from each other geographically, with discontinuous breeding ranges in sometimes very different habitats (e.g. Malagasy birds breed on shores of desert lakes, and the geographically-close southern Indian Ocean birds breed on isolated islands subject to a subantarctic climate). Only Antarctic and/or subantarctic birds seem to straggle anecdotally to southern Africa, with only a few observations in tens of years (Brooke *et al.* 1982, Crawford 1997). According to the dispersal pattern of the species and the isolated breeding ranges of most populations, gene flow between populations is most probably very restricted, and selection pressures encountered by them are likely to be different. Even if some Antarctic birds reach Patagonia in winter, the studied specimens from both areas discriminated well in the present analysis, with none being mis-classified with the other group. In this context, recognising the three groups that totally discriminated in this study (on the basis of biometrics and plumage pattern) as distinct subspecies has to be valid, even if data on vocalizations or DNA sequences are not available at the moment.

Studies on biometrics and plumage pattern using discriminant approaches have already proved to be pertinent in segregating birds belonging to different subspecies (see e.g. Bretagnolle *et al.* (2000) for the study of *Puffinus lherminieri bailloni* and *P. l. nicolae*, with a discrimination rate of 86%, a lower value than that observed in this Kelp Gull study).

Proposed taxonomy of Kelp Gulls

On the basis of the statistical analyses above, three populations of Kelp Gulls are totally separable from nominate *dominicanus* and South African *vetula* on the basis of their biometrics and plumage. These populations are those breeding in 1) the subantarctic Indian Ocean, 2) Madagascar, and 3) Antarctica. I propose that these should be recognized as distinct subspecies, fully accepting that further study, especially of DNA, might further modify our understanding of the taxonomy of the Kelp Gull. For the first two of these populations new names are needed, while for the third population a name already exists. I propose the following systematic treatment of these populations.

For the populations that breed in the subantarctic Indian Ocean, I propose the name

Larus dominicanus judithae, subsp. nov. Kerguelen Kelp Gull

Holotype. Muséum national d'Histoire naturelle in Paris, n° 1974-1955, adult female collected on Kerguelen Islands at Anse du Pacha on 22 February 1971 (coll. Derenne - Lufbery).

Diagnosis. Similar to *L. d. dominicanus* and *L. d. vetula*, but the smallest of all Kelp Gulls, with short and deep bill, vermilion red orbital ring and always pale ivory or pale yellow iris during the breeding season; no breeding birds with a dark iris have been reported. The main differences from other subspecies are always white mirrors on the outer two primaries, and obvious white tongues on at least two or three median primaries. Juveniles are particularly dark, with uniform sooty-brown plumage (Fig. 5). Extensive dark on the head and body can be retained until three years old. Measurements of males and females from this subspecies are given in Table 7, mirror and tongue scores in Table 8.

Description of holotype. Saddle and upperwing uniform slate black (though with a brown cast due to wear); head and body pure white. Very large mirror on P10 (5 cm

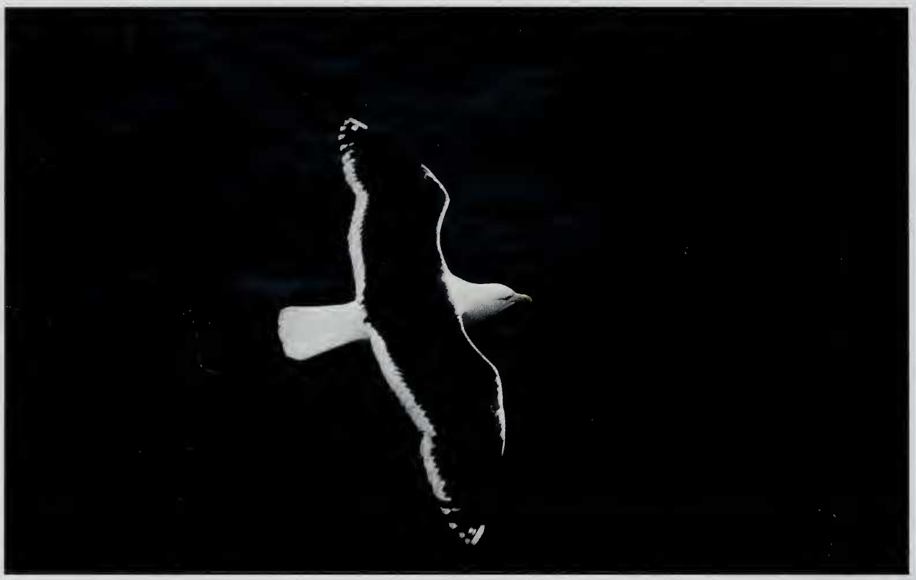

Fig. 5. Above: flying adult showing the typical wing pattern of *Larus dominicanus judithae*, with white mirrors on P10 and P9 and obvious white tongues on median primaries; below: adult pair and offspring of *Larus dominicanus judithae*, showing general structure (short and deep bills) and extensive white on wing tips of adults, and the dark plumage of the juvenile. Photographs by F. Jiguet.

long) merging into the white tip of the feather, with some black on each side of the tip. Small mirror on P9 restricted to the inner web, which it crosses completely. Large white tips to primaries, secondaries and tertials. Obvious white tongues on P5, P6 and P7 (though less prominent outwards). No black on P4. P9 is 4 mm longer than P10, and four primary tips visible beyond the tertials. Measurements (mm) of holotype are: wing 392; tarsus 60.4; culmen 47.0; bill depth at gonys 18.6; bill depth at nostrils 16.3.

Paratypes. Muséum national d'Histoire naturelle in Paris, n° 1974-1950, adult male collected on Kerguelen Islands on 22 February 1971 (coll. Derenne – Lufbery); n° 1974-1957, adult female collected on Kerguelen Islands at Pointe Denis on 23 January 1971 (coll. Lufbery); n° 1951-663, adult male collected on Kerguelen at Baie des Français on 27 January 1951 (coll. Ph. Milon).

Paratypic variation. Differences from the holotype are white tongues on P6-7 only and then P5 with black outer and white inner web; or white tongues on P6-7-8. Large white mirror on P10 either separated from white tip by a black bar, or continuous with white tip with small amount of black, or complete merging with no black at all. Very rarely, a very small whitish mirror is present on P8.

Distribution of taxon. Breeds in southern Indian Ocean on subantarctic islands (5,000-10,000 pairs): Kerguelen (4,000-8,000 pairs), Crozet (700-1,400 pairs), and also very probably Heard (100+ pairs), Marion (200 pairs) and Prince Edward (30 pairs) Islands, though specimens from these three islands were not examined during this study (population sizes after Higgins & Davies 1996). Measurements given by Brooke & Cooper (1979) for Kelp Gulls on Marion Island are similar to those obtained on Kerguelen and Crozet Islands, while birds there all display white mirrors on outermost two longest primaries (Jiguet *et al.* 2001).

Etymology. *Judithae* is derived from the feminine first name Judith. This subspecies was named in honour of Judith who supported my one-year long works on seabirds at Kerguelen Islands.

For the population that breeds in Madagascar, I propose the name

Larus dominicanus melisandae, subsp. nov. Malagasy Kelp Gull

Holotype. Muséum national d'Histoire naturelle in Paris, n° 1974-76, adult female collected on Madagascar at Nosy Manitra on 19 July 1948 (coll. Ph. Milon).

Diagnosis. Smaller than *vetula*, and with smaller white tongues on median primaries, but with similarly long but thinner bill. Differs from nominate *dominicanus* in long bill, and one or rarely two very restricted white tongues on median primaries (none on P6-7), in the fashion of *L. fuscus intermedius* or *L. f. fuscus*, thus close - and at closest within Kelp populations - to *L. fuscus*. White mirror only on longest primary and very small (*c.* 1 cm^2). Different authors described the iris as pale yellow and the orbital ring as red (Langrand 1990, Morris & Hawkins 1998, Sinclair & Langrand 1998, Jiguet *et al.* 2001). Measurements of males and females from this subspecies are given in Table 7, mirror and tongue scores in Table 8.

Description of holotype. Saddle and upperwing uniform slate black, sometimes suffused grey (new feathers); head and body pure white. Very small white mirror on the outermost primary (P10), restricted to the inner web and 1cm long. P9 to P6 blackish. Small white tips to primaries, large white tips to secondaries and tertials. One white tongue on P5, while P4 shows some black on outer web. White marginal coverts on upperwing producing obvious white leading edge to the wing. No indication of bare part colours on label. P10 slightly longer than P9, so that five primary tips are visible beyond the tertials. Measurements (mm) of holotype are: wing 418; tarsus 60.7; culmen 54.6; bill depth at gonys 18.8; bill depth at nostrils 17.3.

Paratypes. Muséum national d'Histoire naturelle in Paris, n° 1932-161, adult male collected on Madagascar south of Tulear on 27 February 1930 (coll. Delacour); n° 1932-162, adult female collected on Madagascar at Androka on 7 March 1930 (coll. Delacour); the latter had yellow iris and red eye ring when collected (from label).

Paratypic variation. Differences from the holotype are: white tongue also present on P4, but black separating white tongue and tip interrupted on inner web. White mirror on P10 slightly extending onto outer web, but on a few mms only. Fine grey streaks on head and neck in March, at the beginning of the post breeding complete moult.

Distribution of taxon. Along coasts of south-west and south Madagascar, from Toliara to Tôlanäro. The species is common on Lake Tsimanampetsotsa (Langrand 1990, Morris & Hawkins 1998). Since Brooke & Cooper (1979), breeding between October and January on Madagascar has been reported by Langrand (1990). Population size unknown.

Etymology. Melisandae is derived from the feminine first name Mélisande, itself derived from the greek *melanos*, which means black, and fits well the dark wing pattern of Malagasy Kelp Gulls, which is the blackest in the species.

For the populations that breed in Antarctica, I propose to resurrect the name *austrinus* Fleming. The name *austrinus* was already attributed to birds from the South Shetlands in Antarctica (Appendix). As there is no evidence that birds from the Antarctic Peninsula differ from those breeding on the South Shetland Islands, a conservative approach is to group all of these under the name *L. d. austrinus*, Antarctic Kelp Gull. The holotype is the one referred to by Fleming (1924): n° 28492 of the personal collection of J.H. Fleming, adult male collected on 13 March 1922 on Deception Island, South Shetlands. This type is now preserved at the Royal Ontario Museum, Toronto (registration n° 39471). The description of *austrinus* by Fleming does not relate differences between nominate and Antarctic birds, but the description of the type specimen provided by Dr Brad Millen fits the Antarctic birds I examined in Paris.

Further studies involving measurements, wing pattern and also bare parts colouration should provide more information about the taxonomic status of some

Kelp Gull populations. For example, there is no doubt that, in a study considering iris and orbital ring colours, *vetula* would highly discriminate from *dominicanus*, *judithae*, *melisandae* and *austrinus*. Larger sample sizes for birds from South America, the Falklands and especially South Georgia should allow sex-specific analyses of biometrics and wing pattern, which could reveal further unrecognised taxa. In addition, DNA sequencing is needed to help with further clarifying the taxonomy and eventual specific status of over-looked or recognised subspecies.

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Appendix

Nomenclatural review

In the early literature, the Kelp Gull was listed erroneously under specific names of black-backed gull species from the Northern Hemisphere, i.e. *L. marinus* and *L. fuscus* (reviews in Peters 1934). The following names that have been applied to the Kelp Gull *L. dominicanus* are compiled from Saunders (1896), Dwight (1925), Peters (1934), Murphy (1936), Fleming (1924), Hellmayr & Conover (1948), and from original descriptions cited and personal observations at the BMNH and the MNHN. I also contacted all museums that could potentially hold type specimens described under all names I came across. Museums contacted were: MNHN, BMNH, Natural History Museums in New York (AMNH), Washington, Toronto (Royal Ontario Museum, Canada), Wellington (Dominion Museum, New Zealand), Wiesbaden, Mainz, Frankfurt and Berlin (Germany). There is no type specimen of *L. dominicanus* in the BMNH collection (*fide* Mr M. Walters).

Larus ***dominicanus*** Lichtenstein, 1823, was described from coasts of Brazil. The original description is in a catalogue of duplicate specimens for sale by Lichtenstein (then director of the museum in Berlin). The type is still in the collection at the Museum für Naturkunde in Berlin (catalogue n° ZMB 13566).

The type of *Dominicanus* ***vetula*** Bruch, 1853, comes from South Africa. It is an unsexed adult preserved at the MNHN in Paris (registration n° 14469), collected in 1820 by M. Delalande at Cape of Good Hope. Measurements (mm) of the type are: wing 417; tarsus 62.5; culmen 47.5; bill depth at gonys 21.0; bill depth at base of nostrils 19.0. The name *Gabianus* ***vetulus*** is also found on the label of an African specimen preserved at the MNHN, with no description associated.

The type of *Larus dominicanus* ***austrinus*** Fleming, 1924, collected on the South Shetland Islands, was part of J.H. Fleming's private collection, and is now in the collection of the Royal Ontario Museum (catalogue n° 39471). The type specimen (a male) has been examined on my behalf by Dr Brad Millen. Measurements (mm) of the type are: wing 415; tarsus 62.8; culmen 48.8; both wings show one white mirror and three white tongues. Fleming described this subspecies on the basis of slightly paler slate black upperparts. The subspecific status of *austrinus* was later invalidated by Dwight (1925) and Murphy (1936) who examined very large series from many localities. Dwight (1925) noticed only a slight difference between *austrinus* birds and other *dominicanus*, insufficient for subspecific recognition, arguing that specimens in fresh plumage are greyer in tone and that *austrinus* birds were indistinguishable from those in a series taken in South America and New Zealand.

According to Hellmayr & Conover (1948), *Larus verreauxi* Bonaparte, 1854 is a *nomen nudum*. Bruch and Bonaparte simultaneously published descriptions of *verreauxi* in 1855. Both described specimens from Chile, though while Bruch reported that he consulted *Dominicanus verreauxi* at the MNHN, Bonaparte omitted to cite the location of type(s) (Hellmayr & Conover 1948). Bruch also cited Bonaparte's paper (with the pre-publication or erroneous date 1854) in his text, so that *verreauxi* should be attributed to Bonaparte, 1855 (1854) (cf. Art. 21.8 of ICZN 1999). The name is also found with different spellings in subsequent publications: *verreauxii, verrauxii,* and *verrauxi*, which are therefore *lapsi calami* (Art. 32.5.1 of ICZN 1999). The only Chilean specimens still preserved at the MNHN arrived there in 1872, and no previous bird from Chile was registered in the exit catalogue from 1844 to the present. The type or type series of *verreauxi* has thus been lost.

Dominicanus ***vociferus*** Bruch, 1853, was described from South America, with no more precise location. Bruch added 'Anglorum' after '*vociferus'*, signaling this name was used in England. Bruch (1853) inferred that no labelled type specimens of *vociferus* ever existed in England, an absence confirmed by Mr M. Walters, BMNH. Rather than seeing English skins, Bruch appears to have based his remarks on the literature or correspondence using what he understood to be the current English terminology. Bruch (1855) stated later that he based his description of *D. vociferus* on specimen(s) preserved at the Mainz museum (where he worked), and thus the type or type series had to be there. However, the whole Mainz collection was destroyed during the second world war.

Dominicanus ***pelagicus*** Bruch, 1853, was described from birds collected in 'Indien und Oceanien', also with the term 'Anglorum' added to the name. As for *vociferus*, Bruch did not see English skins, and no type ever existed in England. Bruch (1855) specified he consulted specimen(s) of *pelagicus* in Mainz, but the whole collection there was lost. There is no record of Kelp Gull in India (Grimmett *et al.* 1998), and Australia was colonised only in the 1940s (Higgins & Davies 1996). As there is no type specimen to verify its true taxonomic status, I consider *pelagicus* a *nomen dubium*.

Larus ***antipodus*** Gray, 1844, is reported from New Zealand. However, Gray (1844) just cited specimens in his catalogue as '*Larus antipodus?*', and no description was associated to this name. At this stage, *antipodus* is a *nomen nudum*. Bruch (1853) gave a short description of *Dominicanus antipodus* based on specimens preserved in Mainz, thus *antipodus* should be attributed to this author (*Dominicanus antipodus* Bruch, 1853) – *D. antipodum*, Bruch, 1855, is the same name, differently accorded. As the collections in Mainz have been lost, there is actually no type for *antipodus*.

Larus ***azarae*** Bonaparte, 1857, was described from Brazil and Patagonia (see also Lesson 1831). The description by Lesson of "La Grande Mouette d'Azara" (no Latin name) from Brazil states that the taxon has yellow bill, white body and brown wings and tail. Lesson (1831) probably omitted to signal that he was first describing an adult bird, then an immature bird in the last part of his text. Bonaparte (1857) first used the name *azarae* for this taxon, and it should be attributed to him. Bonaparte based his description on specimens from Brazil and Patagonia consulted at museums in Frankfurt and Paris ("Mus. Francof. Paris"), so the type series of *azarae* should be in the collections of these museums. The MNHN holds two specimens from Brazil (one juvenile and one adult), collected in July 1820 by M. Auguste de Saint Hilaire (registration n° 2001-77 and 2001-78), and one first-winter specimen from Patagonia donated in February 1831 by M. d'Orbigny. Although four specimens from Patagonia were donated by M. d'Orbigny, according to the MNHN donation catalogue, only one is still present in the collection in 2001 (registration n° 2001-80). All these birds were present at the MNHN when Bonaparte described *azarae*. The Museum at Frankfurt holds one specimen from Brazil, donated in 1822 by Freireiss (registration n° SMF 15068). According to Art. 72.4.1.1 (and associated example) of ICZN (1999), all the specimens cited by Bonaparte constitute the type series, in which can be designated lectotypes (ICZN 1999, Art. 74).

The type of *Dominicanus* ***fritzei*** Bruch, 1855, collected at Straits of Sunda, Java, by Dr. Fritze (under the name *Larus fuscus*), was deposited in the Wiesbaden Museum, and is still there (registration n° 2233). Bruch (1855) accepted the specific status of this bird on the basis of its large size, as large as *L. marinus*. However, the locality of collection seems unreliable for Kelp Gull, but also for any other large black-backed gull species. Dr. Fritz Geller-Grimm provided me with photographs and measurements (mm) of the type: wing length 445; bill length 59; bill depth at gonys 28; bill depth at base of nostrils 24; tarsus 70. This specimen has yellow legs and only one white mirror, on the outermost primary (P10). The huge bill depths alone indicate that this bird is not a Kelp Gull, and must be regarded as unidentified.

Larus ***flavipes*** Temminck, 1840, was described from the Cape of Good Hope, South Africa. It thus potentially antedates *vetula*, Bruch, 1853. However, Wolf & Meyer first described *Larus flavipes* in 1805 from a type specimen belonging to *L. f. fuscus*, according to Dwight (1925) (see also Lesson 1831). Bruch (1853, 1855) already considered *flavipes* a junior synonym of *fuscus*.

Larus ***littoreus*** Forster, 1844, was described from the Cape of Good Hope, South Africa. The name *littoreus* (sometimes written *litoreus*, a *lapsus calami*) therefore potentially antedates *vetula*. Forster was however preoccupied by *L. littoreus*, Forster, 1781, which is indeterminate but should probably be referred to *L. f. heuglini*, Bree, 1876 (Saunders 1896), which name it would antedate (for further details see Brooke & Cooper 1979). Accordingly, *littoreus* should not be considered to refer to *L. dominicanus* (Brooke & Cooper 1979).

The type of *Lestris* ***antarcticus*** Ellman, 1861, was collected in New Zealand. However, *Lestris antarcticus* was already used by Lesson (1831) to describe *Catharacta antarctica*, and reporting this name for a Kelp Gull is a misapplication (ICZN 1999, Art. 49). The true synonymy of *L. antarcticus* is with *C. antarctica*.

The name *Larus* ***capensis*** (Smith) was reported by Saunders (1896) from the label of a specimen from South Africa preserved at the BMNH, but without a description. Accordingly, *capensis* is a *nomen nudum*.

Larus ***melanoleucus*** Boies, 1844 (Isis, p.196), from New Zealand is a *nomen nudum* (see Matthews & Iredale 1913).

In addition to these names, a specimen from Nightingale Island, Tristan da Cunha, labelled *Larus* ***dominicensis*** (BMNH, registration n° 1922-12-6-41), has no published reference, and should be considered a *nomen nudum*.

Larus ***pacificus*** Layard, 1863, was given to Kelp Gulls observed in New Zealand, but the author confused the Latin name of the Pacific Gull, already known as *Gabianus pacificus* (Lath.) by Bruch (1853).

It appears pertinent to designate a lectotype for *azarae*, and neotypes for *antipodus* and *verreauxi*, in order to help to clarify their true taxonomic status (ICZN 1999, Art. 75.3.1). Concerning *vociferus* (locality of collection given as a general 'South America'), I decided not to designate a neotype, especially because of the poorly defined locality of collection and therefore non evident interest of maintaining a particular taxonomic status.

Lectotype of *Larus azarae* Bonaparte, 1857: Muséum national d'Histoire naturelle in Paris, adult from Brazil donated by M. A. de Saint Hilaire and received in July 1820 (n° 795 of his catalogue), current registration n° 2001-78. As Bonaparte (1857) first cited Brazil as the type locality, this being the sole locality also cited by Lesson (1831), and as the largest part of the type series is at the MNHN, I designate the adult specimen from the MNHN as the lectotype of *azarae*.

Neotype of *Larus verreauxi* Bonaparte, 1855 (1854): Muséum national d'Histoire naturelle in Paris, n° 2001-79, adult male collected in Chile, donated to the MNHN in 1872 by Boucard (Coll. Reed).

Neotype of *Dominicanus antipodus* Bruch, 1853: Muséum national d'Histoire naturelle in Paris, n°1846-1233, adult collected in New Zealand, donated by M. Arnoux in 1846. The neotype was chosen from those specimens from New Zealand already present in the MNHN collections in 1846, thus certainly seen by Bruch during his visits to Paris.

Junior synonyms of *dominicanus*

Birds from Patagonia, western South America, the Falkland Islands and South Georgia are best still regarded as belonging to nominate subspecies, though further work is needed to clarify their true taxonomic status. On current knowledge, and as long as there is no evidence of differences between birds from the east and west coasts of South America and from New Zealand, all names *azarae, verreauxi, vociferus* and *antipodus* should be considered junior synonyms of *dominicanus*.

Notes on the generic citation of the Oilbird *Steatornis caripensis* (Steatornithidae)

by Nigel Cleere

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The Oilbird *Steatornis caripensis* is a monotypic, neotropical species that was described by Alexander von Humboldt, who gave it a generic name in 1814 (von Humboldt 1814) and a specific name three years later (von Humboldt 1817a). The citation for the generic name *Steatornis* has long been given as 'Humboldt 1814, Voy. Intér. Am. 1, p. 416' (cf. Peters 1940), but this appears to be inaccurate and requires comment and correction.

Between 1799 and 1804, von Humboldt and the French botanist Aimé Bonpland travelled widely in South America and published the results of their travels in an immense work entitled '*Voyage aux régions équinoxiales du Nouveau Continent, fait en 1799, 1800, 1801, 1802, 1803 et 1804*'. This was accomplished through a series of livraisons and livres that were issued between 1805 and 1835, bound in 30 volumes to form six parts: Relation Historique, Zoologie, Essai Politique, Astronomie, Physique Générale and Botanie (Sherborn 1899, Löwenberg 1960).